Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Expanding Flexible Use of the 3.7 to 4.2 GHz Band	)	GN Docket No. 18-122
	)	

To: The Commission

EMERGENCY PETITION TO STAY INITIATION OF 5G OPERATIONS AT CERTAIN DESIGNATED AIRPORT LOCATIONS

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Dated: December 30, 2021

SUMMARY

Airlines for America (A4A), the association of the 10 major U.S. passenger and cargo airlines (plus Associated Member Air Canada), hereby seek an emergency stay of the initiation of new 3.7 GHz license service in certain designated airport locations listed in Exhibit 1. A4A requests that the stay remain in place until the Commission has ruled on the pending petition for reconsideration in Docket No. 18-122 filed by the aviation stakeholders to enable the Federal Aviation Administration and the Commission to resolve issues of aviation safety caused by harmful interference from the new 3.7 GHz licenses to radio altimeters.

Despite the issue of harmful interference to altimeters having been raised by aviation interests, including A4A, since the beginning of the C-band proceeding, the Commission has never provided a reasoned analysis of why it has rejected the evidence submitted by the aviation interests.

Although the wireless carriers postponed the inauguration of service from December 5, 2021, to January 5, 2022, there has still not been a resolution of this issue. The FAA – the federal agency principally responsible for aviation safety – has now issued an Airworthiness Directive that concluded that an unsafe condition is likely to exist or develop in transport and commuter category airplane because of the interference impact of new 3.7 GHz license service on radio altimeters. Aircraft will not be able to rely on radio altimeters for numerous flight procedures and thus will not be able to land at certain airports.

A4A member airlines confront the impending need to (a) reroute and/or cancel thousands of airline flights, (b) dislocate millions of passengers and airline crews and (c) delay delivery of time-sensitive, critical shipments (including COVID-19 vaccines and tests). The resulting economic losses are estimated at more than $1 billion because of their inability to rely on the proper operation of aircraft altimeters due to the interference in their operation caused by higher-powered 3.7 GHz licensees.

In the C-band Report and Order, the Commission summarily dismissed the concerns articulated by the aviation community during the course of the rulemaking that the new 3.7 GHz licenses would cause harmful interference. Accordingly, the aviation interests timely filed a partial petition for reconsideration in May 2020. Nineteen months later, the Commission has not acted on the reconsideration petition nor has it provided a reasoned analysis of why it rejects the evidence presented by the aviation community during the rulemaking and continuing forward to present day.

A4A's emergency petition meets the test for grant of a stay.

Absent the grant of a stay, the airline industry will suffer irreparable harm. In addition, the traveling public and the American economy, which depends on the air transportation system, will incur significant financial losses amounting to billions of dollars. Moreover, this does not include the downstream effects that the disruption in commercial air service will have on customers and the U.S. economy as a whole that is still recovering from supply chain disruptions as a result of the Covid-19 pandemic

The aviation stakeholders will prevail on their legal claims that the Commission has improperly failed to explain why it rejected record evidence of the detrimental impact of interference from 3.7 GHz licenses on radio altimeters. An administrative agency like the FCC must address significant comments made in a rulemaking proceeding and respond in a reasoned manner to those that raise significant problems. Here, the Commission has summarily dismissed comments pointing out documented, serious risks to aviation safety from interference to altimeters. The Commission has failed to provide even minimal clarity as to how it has dismissed the record evidence of interference to radio altimeters and consequential impacts on aviation safety, which is itself arbitrary and capricious.

The public interest will not be harmed by the requested stay. Although the public has an interest in 5G mobile services, it also has an interest in aviation safety. A4A is not seeking a full stop to

new 5G service, but in fact only a stay of initiation of operations in certain designated airport locations listed in Exhibit 1.

The disruptions to the 3.7 GHz licensees will not be to existing operations, but rather to the rollout of a new service. Thus, any adverse impact will entail some delay in implementation of the new service, but will not impact ongoing operations. More importantly, members of the public are not likely to be affected at all by such delay. By contrast, virtually the entirety of the American public will be significantly and adversely affected if the January 5th date is not stayed.

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AIRLINES FOR AMERICA ("A4A"),[1] pursuant to Sections 1.41, 1.43 and 1.44(e) of the Commission's Rules,[2] hereby requests the Commission stay initiation of new 3.7 GHz flexible licensee services, currently set to commence on January 5, 2022, in certain designated airport locations listed in Exhibit 1, pending resolution of issues related to interference with aircraft altimeters. This interference will cause irreparable harm and jeopardize the function of critical aircraft safety systems, which in turn threatens to divert or cancel thousands of flights every day, thus disrupting millions of passenger reservations, causing substantial disruptions for air crews, further interrupting the U.S. and global supply chains, and eroding the safety margin that the industry and the Federal Aviation Administration ("FAA") have worked so hard to achieve. A4A respectfully requests that the Commission act on this Emergency Petition by no later than 12 Noon EST, January 3, 2022, failing which A4A will be forced to seek judicial or other relief to avoid the immediate and unacceptable safety risks to its members' operations from interference to radio altimeters by new 3.7 GHz 5G mobile services, set to launch on January 5, 2022, and to the public's convenience as a result of those actions which commercial aircraft operators can

[1] A4A is the trade association of the major commercial carriers in the United States. Members are Alaska Airlines, Inc.; American Airlines, Inc.; Atlas Air, Inc.; Federal Express Corporation; Hawaiian Airlines; JetBlue Airways Corp.; Southwest Airlines Co.; United Air Lines, Inc.; and United Parcel Service Co. Air Canada is an Associate Member.

[2] 47 C.F.R. §§ 1.41, 1.43 and 1.44(e).

reasonably be foreseen to take in prudent response to the risks presented by that interference.

1. For the avoidance of doubt, A4A and the aviation community strongly support the authorization, development and implementation of new 5G services in the 3.7-4.2 GHz band. A4A applauds the progress that the Commission has made on most issues involving the new services. However, that support is not without qualification when questions of aviation safety are raised that impact the member companies of A4A, the traveling public, flight crews and those that are dependent on the global supply chain.

2. As early as May 31, 2018, A4A filed comments in Docket No. 18-122 warning against "any encroachment upon the operation of aircraft radio altimeters in the adjacent 4.2-4.4 GHz band."[3] Nevertheless, when the Commission adopted the Report and Order repurposing 300 MHz of the C-band to allow for new high-powered 5G mobile service,[4] the Commission failed to provide a reasoned analysis that realistically and properly addresses the documented concerns of the aviation industry about interference from the new 3.7 GHz licensees with radio altimeters, which have exclusive use of the 4.2-4.4 GHz frequency band.[5] These concerns have been repeatedly raised by the aviation stakeholders since the beginning of the C-band proceeding, were summarily dismissed in the Report and Order, then raised again on reconsideration by the aviation stakeholders. Yet a year-and-a-half later, the Commission has not addressed them.

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[3] A4A Comments, filed May 31, 2018, at 3.

[4] In the Matter Expanding Flexible Use in the 3.7 – 4.2 GHz Band (Report and Order and Order of Proposed Modification in GN Docket 18-122), 35 FCC Rcd 2343 (subsequent history omitted) (the "Report and Order").

[5] *See* 47 C.F.R. § 2.106, notes 5.438 and US261 (indicating that "[u]se of the band 4200-4400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground," note 5.438, and indicating "use of the band 4200-4400 MHz by the aeronautical radionavigation service is reserved exclusively for airborne radio altimeters," note US261).

3. Altimeters are critical to the operation of every commercial flight in the United States. Outputs of radio altimeters and the several certified aviation systems that rely upon radio altimeter input (i.e., height above terrain) are critical for safe and efficient flight, especially during periods of poor weather or low visibility and during difficult maneuvers routinely encountered by pilots, as well as for proximity warnings to the ground and other obstacles. Many types of aircraft utilize two or three co-located radio altimeters to provide the necessary integrity and availability requirements, which typically involve using all of the 200 MHz of the 4.2-4.4 GHz being used by a single aircraft.

4. As the FAA acknowledged in its issuance of Safety Alert for Operators 21007 (December 23, 2021) ("SAFO 21007"):

> "a wide range of other automated safety systems rely on radio altimeter data whose proper function may also be affected. Anomalous (missing or erroneous) radio altimeter inputs could cause these other systems to operate in an unexpected way during any phase of flight – most critically during takeoff, approach, and landing phases. These anomalous inputs may not be detected by the pilot in time to maintain continued safe flight and landings."

5. Thus, given the critical role of altimeters to other safety systems, air carriers and crewmembers likely will not be able to reliably use critical, required safety technologies that the industry spent decades developing and investing in to ensure safety of flight, such as Class A Terrain Awareness Warning Systems, Enhanced Ground Proximity Warning Systems, Traffic Alert and Collision Avoidance Systems, take-off guidance systems, flight control (control surface), tail strike prevention systems, windshear detection systems, envelope protection systems (limits on flight control surface deflection, pitch and bank limits, and G loading limits), altitude safety call outs/alerts, auto throttle and autothrust, thrust reversers, Flight Directors, primary flight display of height above ground, alert/warning or alert/warning inhibit systems, stick pusher/stick shake, engine and wing anti-ice systems, and Automatic Flight Guidance and

Control Systems (AFGCS).[6] These integrated systems or functions are used in every flight operation, regardless of weather conditions and any interference as a result of 5G deployment will present a constant, recurring daily risk to the National Airspace System that cannot be addressed without further analysis and joint industry development of appropriate mitigations. Tragically, anomalous radio altimeter data has in fact led to loss of life in at least one commercial aviation accident.[7]

6. To the extent that the radio altimeter 4.2-4.4 GHz frequencies are subject to interference, the thousands of passenger and cargo airplanes that are completely dependent on those frequencies will be unable to assume the reliability of their long-standard telemetry. This accounts for virtually the entire fleet of the A4A member airlines.

7. When the Commission's C-band Report and Order failed to adopt adequate protections for altimeters which had been proposed by the aviation stakeholders during the rulemaking,[8] the aviation stakeholders sought partial reconsideration of those provisions of the Report and Order dealing with altimeters. That request was submitted 19 months ago, but the Commission has still not responded to the reconsideration petition.[9]

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[6] Safety Alert for Operators, Federal Aviation Administration, SAFO21007, "Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band Interference," dated December 23, 2021, at 2 ("SAFO21007"). The Commission itself has acknowledged that "Radio altimeters are critical aeronautical safety-of-life systems primarily used at altitudes under 2500 feet and must operate without harmful interference." Report and Order, 35 FCC Rcd at 2350 (¶ 12).

[7] There are "real world" consequences to faulty radio altimeter operations. On February 25, 2009, Turkish Airlines flight 1951 crashed during landing at Amsterdam Schiphol Airport (Netherlands), resulting in the deaths of nine passengers and crew, including all three pilots. The crash was caused primarily by the aircraft's automated reaction, which was triggered by a faulty radio altimeter.

[8] *See, e.g.*, "Behavior of Radio Altimeters Subject to Out-Of-Band Interference," attachment to Letter of Dr. David Redman, Aerospace Vehicle Systems Institute, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 18-122 (filed Oct. 22, 2019) ("AVSI October 2019 Study").

[9] In the interim, the Commission has denied an Application for Review filed by ACA Connects

8. Private sector interests were not the only parties that raised this issue of impact on aviation safety. Last year, the FAA and the Department of Transportation ("DOT") expressed their concerns to the National Telecommunications and Information Administration ("NTIA"). In a letter dated December 1, 2020 to the Acting Director of the NTIA in the agency's role as coordinator of federal spectrum policy, the DOT Acting Deputy Secretary expressed that "as the Executive Branch expert on transportation safety, the DOT is concerned about the safety impact upon aviation that may result from FCC's action" in not protecting radio altimeters.[10] The DOT and the FAA asked the NTIA to "engage with the [FCC] to defer further action" in the C-band proceeding in advance of the scheduled December 8, 2020 auction of spectrum within the 3.7–4.2 GHz spectrum band (the 3.7 GHz band).[11] Apparently, the NTIA never advised the Commission of the concerns regarding interference to altimeters of "the Executive Branch expert on transportation safety." A copy of the letter is Exhibit 2 to this Emergency Petition.

9. The situation has now reached a critical point. Initiation of service on the new 3.7 GHz licenses is set to commence on January 5, 2022.[12] However, the FAA, the federal agency principally charged by Congress to regulate aviation safety, has confirmed the fears of aviation stakeholders. In an Airworthiness

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regarding lump sum reimbursement amounts. In the Matter of Application of ACA Connects – America's Communications Association for Review of the Public Notice of the Wireless Telecommunications Bureau Setting Lump Sum Payment Amounts, GN Docket No. 18-122, released November 19, 2020. However, it has not acted on the petition for reconsideration filed by the aviation stakeholders regarding critical issues of interference affecting aviation safety.

[10] Letter dated December 1, 2020, from Steven G. Bradbury, General Counsel (and performing the functions and duties of Deputy Secretary) of DOT and Steve Dickson, Administrator of the FAA, to Adam Candeub, Deputy Assistant Secretary of Commerce for Communications and Information, Performing the Delegated Duties of the Assistant Secretary of Commerce for Communications and Information National Telecommunications and Information Administration.

[11] *Id.*

[12] The Report and Order specified December 5, 2021, as the date to be able to begin 5G operations in the 3.7 GHz band. *Id.*, at 2432 (¶ 215). However, AT&T and Verizon agreed to a request by the U.S. Department of Transportation ("DOT") to delay inauguration of service until January 5, 2022. "Carriers Delay C-Band Rollout Over FAA Concerns," Law360 (Nov. 4, 2021).

Directive effective on December 9, 2021 (the "Directive"), the FAA concluded that an unsafe condition is likely to exist or develop in transport and commuter category airplanes, the very aircraft flown by A4A member companies.[13] The Directive warns that an "unsafe condition is likely to exist or develop in transport and commuter category airplanes with a radio altimeter" because of the initiation of service by the 3.7 GHz licensees.[14] Further, the Directive advises that these circumstances will require "prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band wireless broadband signals as identified by NOTAM".[15] (A notice to air missions, or "NOTAM," "is a notice containing information essential to personnel concerned with flight operations but not known far enough in advance to be publicized by other means. It states the abnormal status of a component of the National Airspace System (NAS) – not the normal status.").[16] Compliance with the prohibitions set forth in the Directive will be mandatory for every operator once the FAA issues these NOTAMs. Currently, A4A expects the NOTAMs to restrict operations at or near 135 or more 14 CFR Part 139-defined airports (airports with scheduled service) lying in or nearby the 46 PEAs and that are also within a radius of approximately 42 miles of a C-Band 5G transmission tower. Deployment must be suspended for any such tower locations driving the FAA NOTAMS.

10. Pilots rely on the radio altimeter as a tool to conduct safe flight operations. The presence of 3.7 GHz 5G service in certain locations near airports will deprive aircraft operators of this tool and, to comply with the Directive and corresponding NOTAMS in the interest of public safety, A4A member airlines

[13] Docket No. FAA-2021-0953; Project Identifier AD-2021-01169-T; Amendment 39-21810; AD 2021-23-12 (Airworthiness Directive), 86 FR 69,984, 69985 (Dec. 9, 2021) (the "Directive"). A copy of the Directive is contained in Exhibit 3 to this Emergency Petition.

[14] *Id.*

[15] *Id.*

[16] FAA, What Is a NOTAM, *available at* https://www.faa.gov/about/initiatives/notam/what_is_a_notam.

confront the impending need to (a) reroute and/or cancel thousands of airline flights, (b) dislocate millions of passengers and airline crews and (c) delay delivery of time-sensitive, critical shipments (including COVID-19 vaccines and tests). The resulting economic losses are estimated at more than $1 billion because of their inability to rely on the proper operation of aircraft altimeters due to the interference in their operation caused by higher-powered 3.7 GHz licensees.[17] A4A's estimates that U.S. passenger airlines would incur an increase of $1.7 billion in operational cost annually, while passengers themselves would suffer an annual additional cost of approximately $1.59 billion. Similarly, cargo operators conservatively estimate that it would cost them $400 million annually.[18] This estimate does not include indirect impacts to customers who are dependent on the U.S. and global supply chains and the negative impact on the U.S. economy as a whole that results when these points of critical connectivity are disrupted.

11. In addition, airline customers rely on airlines to transport time-sensitive perishable products such as vaccines, pharmaceuticals, bodily organs, critical supply chain parts, and many other high-value items. The lack of serious mitigation efforts to address interference issues will significantly disrupt and harm the economy at a time when supply chains are already stretched thin. Reasonable restrictions on service in and near airport locations have been adopted in other countries, as noted below.

12. The Commission must stay the implementation of 3.7 GHz services in certain designated airport locations listed in Exhibit 1, currently set for January 5, 2022, until the Commission has ruled on the pending petition for reconsideration to enable the FAA and the Commission to resolve these vital

[17] Safety issues aside, A4A estimates that the damage will involve 345,000 passenger flights, 32 million passengers, and 5,400 cargo flights in the form of delayed flights, diversions, or cancellations. Ex Parte Notice Letter dated December 20, 2021, from David Silver, Vice President, Civil Aviation, Aerospace Industries Association, to Marlene H. Dortch, Secretary of the Commission and filed in Docket No. 18-122, at 1.

[18] Id., at 14-15.

technical issues.

I. Background

13. The Commission has been aware of the aviation industry's concerns regarding interference from new, higher powered 5G services operating in the C-band of frequencies since the beginning of the C-band rulemaking. As early as May 31, 2018, A4A filed comments in response to the Commission's initial public notice opening Docket No. 18-122.[19] In that original filing, A4A noted that A4A and other aviation stakeholders warned against "any encroachment upon the operation of aircraft radio altimeters in the adjacent 4.2-4.4 GHz band."[20]

14. This concern about the impact of high powered 5G mobile services on altimeter operations in adjacent frequencies was also raised in the comments filed by Aviation Spectrum Resources, Inc., ("ASRI"), the communications engineering company owned by the member airlines of A4A and other airspace users, and presented on behalf of airline and other aviation stakeholders. ASRI specifically cautioned that it had already encountered interference problems in testing and that "if such interference were received in real world aircraft operations, it would create an immediate safety issue that would threaten aircraft safety and significantly reduce operations."[21]

15. In addition, after the Commission released the draft Report and Order but before its adoption, Aviation Petitioners, the Aerospace Vehicle Systems Institute ("AVSI") and other aviation and aerospace interests submitted evidence into the record, including: (1) data indicating the need to address the potential for interference to radio altimeters; (2) detailed technical responses to the single critic which

[19] *Public Notice*, "OET, et al., Seek Comment for Report on Feasibility of Allowing Commercial Wireless Services," 33 FCC Rcd 4506 (Office of Eng. & Technology, et al., 2008).

[20] A4A Comments, filed May 31, 2018, at 3.

[21] ASRI Comments filed October 29, 2018, at 6.

misunderstood the AVSI studies; and (3) a practical study of a simple and common aeronautical configuration, which showed that a single flexible use base station operating under the rules at 3840 MHz, based on the technical parameters set out in the draft Report and Order for flexible use operations, would present a cognizable risk of harmful interference to radio altimeters.[22]

16. Nevertheless, in the final Report and Order, the Commission summarily rejected the evidence offered by AVSI. Without any explanation for its conclusion, the Commission claimed that the "AVSI study does not demonstrate that harmful interference would likely result under reasonable scenarios (or even reasonably 'foreseeable' scenarios to use the parlance of AVSI). We find the limits we set for the 3.7 GHz Service are sufficient to protect aeronautical services in the 4.2-4.4 GHz band. Specifically, the technical rules on power and emission limits we set for the 3.7 GHz Service and the spectral separation of 220 megahertz should offer all due protection to services in the 4.2-4.4 GHz band."[23] Indeed, the Commission did not even offer the kind of assistance with filtering that it offered Fixed Satellite Service earth station licensees ("FSS"), notwithstanding the demonstration that altimeters would receive interference. Radio altimeters are entitled to the same protections that the Commission has afforded adjacent radio systems in other cases, including FSS operations impacted by the new 3.7 GHz licensee high-powered mobile services, even more so in view of the critically important threat to public safety posed by the threatened interference.

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[22] *See* AVSI October 2019 Study, n. __, *supra*. *See also* Petition for Partial Reconsideration of the 3.7-4.2 GHz Report and Order," filed May 26, 2020, by The Aerospace Industries Association ("AIA"), the Aerospace Vehicle Systems Institute ("AVSI"), Air Line Pilots Association, International ("ALPA"), Airbus, Aviation Spectrum Resources, Inc. ("ASRI"), Garmin International, Inc. ("Garmin"), the General Aviation Manufacturers Association ("GAMA"), the Helicopter Association International ("HAI"), Honeywell International Inc. ("Honeywell"), the International Air Transport Association ("IATA"), and the National Air Transportation Association ("NATA") (collectively the "Aviation Petitioners."

[23] Report and Order, 35 FCC Rcd at 2486 (¶ 395).

17. The Aviation Petitioners timely sought partial reconsideration of the Report and Order (the "Petition"), asking the Commission to address "the failure of the *Report and Order* to take into account critical record evidence of the potential for harmful interference to Federal Aviation Administration ("FAA")-certified radio altimeters operating in the safety-of-life 4.2-4.4 GHz allocation from prospective flexible use operations in the newly created 3700-3980 MHz range."[24] The Petition further noted the existence of "evidence in the public record of the potential for interference from flexible use operations that endangers the functioning of the radio altimeter in common single base station situations, which demonstrated the need for further study before appropriate action, if any, could be formulated."[25]

18. Since the filing of the Petition, A4A and other representatives of the aviation community have continued to raise these matters before the Commission, as well as with the FAA and the NTIA.[26] These included proposals for measures to mitigate the problem of interference,[27] as well as a major study of the negative impacts of new wireless operations in the 3.7 GHz band conducted by the RTCA Multi-Stakeholder Group, the so-called MSG Report.[28] The MSG Report concluded that 3.7 GHz operations conducted under the rules adopted in the Report and Order would pose an unacceptable threat of harmful interference to today's commercial radio altimeter systems.[29]

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[24] Aviation Petitioners' Petition for Partial Reconsideration at 1.

[25] *Id.*, at 5 (notes omitted).

[26] *See, e.g.*, Notice of Oral Ex Parte Presentation in GN Docket No. 18-122, dated June 17, 2021; Written Ex Parte Presentation Addressing Threats to Public and Aviation Safety from 3700-3980 MHz Flexible Use Operations into Existing Aeronautical Radar Altimeters, filed May 12, 2021.

[27] Written Ex Parte Presentation – Proposed Mitigations for Flexible Use Licenses to Protect Existing Aeronautical Radar Altimeters, GN Docket No. 18-122, filed December 7, 2020.

[28] "Assessment of C-Band Mobile Telecommunications Interference on Low Range Radar Altimeter Operations," RTCA Paper No. 274-20/PMC-2073 (rel. Oct. 7, 2020), attachment to Letter of Terry McVenes, President & CEO, RTCA, Inc. ("RTCA"), to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 8, 2020)

[29] *Id.*

19. The wireless industry responded to the MSG Report. But rather than address the specific substantive risks highlighted therein and by the aviation community generally, the Cellular Telecommunications and Internet Association ("CTIA") principally disputed the MSG Report's methodology.[30] Moreover, rather than address the specific problems raised in the MSG Report and generally by the aviation community, CTIA relied on claims that omit critically important facts for the Commission's decision.

20. For example, CTIA and the mobile interests have repeatedly claimed that 5G has been deployed worldwide without any threat to aviation safety.[31] However, what CTIA conspicuously fails to mention is that international deployment of 5G operations has been routinely subjected to considerable, specific restrictions.

21. In Japan, although that country has deployed 5G up to 4.1 GHz, the power levels permitted for 5G are lower than the U.S., i.e., up to 48 dBm/MHz. The macro cell power levels are 96% below or only 4% of that permitted in the U.S., while the small cell power levels are less than 1% that permitted in the U.S.[32]

22. In Europe, the 3.4-3.8 GHz band is utilized for 5G. However, there is a separation of an additional 100 MHz than that provided in the U.S. Further, the power levels permitted in most of Europe are 23% less than those permitted in the U.S. In specific cases, the French regulatory authorities have

[30] CTIA Ex Parte Presentation, Expanding Flexible Use of the 3.7-4.2 GHz Band, GN Docket No. 18-122, filed March 4, 2021.

[31] The wireless interests have repeated these misleading assertions most recently within the last month. Ex Parte Letter from AT&T and Verizon to Chairman Jessica Rosenworcel, filed November 24, 2021, at 2 (the "November 24th Proposal").

[32] Written Ex Parte Presentation – Addressing Threats to Public and Aviation Safety from 3700-3980 MHz Flexible Use Operations into Existing Aeronautical Radar Altimeters, filed November 18, 2021, by numerous aviation stakeholders, including A4A, at 5.

imposed 5G exclusion zones to protect public safety. These exclusion zones are consistent with the recommendations made previously to the Commission by U.S. aviation stakeholders. The Czech Republic has imposed similar restrictions on operations near Prague Airport.[33]

23. In Australia, new 5G licenses operate even farther away from the radio frequency band used by radio altimeters. Australian systems operate at 3.605 to 3.700 GHz. Further, the power levels permitted in Australia are 76% lower than those allowed in the U.S.[34]

24. In the United Kingdom, power levels are significantly lower in both the frequency ranges 3.4 - 3.8 GHz, and 3.805 - 4.195 GHz by 62% and 99% respectively. The UK Civil Aviation Authority has stated that "5G mobile base stations operating below 3.8 GHz, especially if they use active antenna systems … pose a viable interference threat [to radio altimeters]".[35]

25. Therefore, CTIA's claim of international deployment of 5G "without any threat to aviation safety" is true only if that claim is supplemented by reference to the substantial protections afforded to the 4.2-4.4 GHz band by other countries, which the Commission has failed to implement or even acknowledge to date.

26. With only days to go before the scheduled commencement of 5G operations in the 3.7 GHz band, AT&T and Verizon have made an initial proposal to address the issue of interference to altimeters ("November 24th Proposal"). Their proposal included, inter alia, to limit C-band effective isotropic radiated power ("EIRP") above the horizon for all 5G base stations to no more than the lesser of: (a) 62 dBm/MHz or (b) $48 + 20 \times \log10(1/\sin(\theta))$ dBm/MHz, where θ is the elevation angle above the horizontal plane of the base station antenna; and (b) to limit C-band EIRP below the horizon for all 5G

[33] Id.

[34] Id.

[35] *Id.*, at 6.

base stations to no more than 62 dBm/MHz.[36]

27. On December 6, 2021, the Aerospace Industries Association ("AIA"), on behalf of the aviation stakeholders, responded to the November 24th Proposal, noting that the telecom carriers' "proposal was insufficient to protect safety of life aviation radio altimeter usage in and around airport and heliport areas and helicopter operations outside of heliport areas."[37]

28. Although on December 22, 2021, CTIA, AIA and A4A announced in a joint press release that they plan to share as much data as possible to resolve concerns that use of the C-band for next-generation wireless signals could interfere with aircraft safety devices,[38] as of the date of this filing, the issue remains unresolved with only days remaining before 3.7 GHz license 5G operations are set to commence with the attendant interference impact on radio altimeters. As a result of this delay and gap in data and analysis, under the FAA Special Airworthiness Information Bulletin AIR21-18R1 (Dec. 23, 2021) ("SAIB AIR21-18R1") and SAFO 21007, air carriers will bear the full brunt and costs associated with mitigating the risks associated with this interference following the restrictions and prohibitions required by FAA. This will continue until such time that confidence in the performance of these critical aviation systems is demonstrated again.

II. Summary of Argument

29. The Commission cannot ignore significant concerns submitted in the rulemaking proceeding about the potential dangers to radio altimeters. These concerns in the record relate to serious safety hazards that arise if the problem is not addressed. Indeed, the Commission itself acknowledged that

[36] November 24th Proposal at 6-7.

[37] Ex Parte Letter from the Aerospace Industries Association to Chairman Jessica Rosenworcel, filed December 6, 2021, at 3.

[38] "Wireless, Aviation Industries To Share Info On C-Band Use," Law360, December 22, 2021.

altimeters cannot operate in the face of harmful interference. In the Report and Order, the Commission has noted that "[r]adio altimeters are critical aeronautical safety-of-life systems primarily used at altitudes under 2500 feet and must operate without harmful interference."[39] Yet, the FCC has inadequately considered the aviation industry's proven concerns.

30. Failure to pause the initiation of 5G service near or at the airports noted in Exhibit 1 will cause immediate and irreparable harm to the Nation's aviation system because of the need to redirect or cancel flights, as well as cause significant disruptions and unexpected costs to the traveling public and all consumers as a result of further disruption and delay in the U.S. and global supply chains as a result of canceled, delayed or rerouted flights.

31. Further, A4A and the aviation stakeholders are offering a tailored remedy to address a serious safety issue. A4A does not seek to stop 5G services in the 3.7 GHz band, but rather seeks to correct the problem in the locations where aviation safety experts have concluded that the problem is most acute and seek time to address any of those problems so that they may be evaluated and, if necessary, properly resolved in the interests of all affected parties.

32. The Commission should stay the initiation of 5G services by 3.7 GHz licensees in the locations noted in Exhibit 1,pending completion of the required risk assessment and technical analysis being conducted currently by the FAA and deployment of any required mitigation to avoid interference with these altimeter systems.

III. Legal Standard for Motion for Stay

33. Whether to grant a stay is governed generally by the standard enunciated by the D.C. Circuit in

[39] Report and Order, 35 FCC Rcd at ¶¶ 12, 390.

Virginia Petroleum Jobbers Ass'n v. Federal Power Commission.[40] The Commission has incorporated this four-part test in reviewing requests for stay.[41] A party seeking a stay must show: (1) that they are likely to succeed on the merits; (2) that they will be irreparably harmed absent a stay; (3) that a stay will not substantially injure other parties interested in the proceeding; and (4) that a stay is in the public interest.[42] A4A submits that absent a stay, the initiation of 5G service on the 3.7 GHz – and the attendant harm -- would be a "fait accompli" before this can be resolved by the airline interests, the mobile carriers, the FAA and the Commission. The result will be significant impacts on aircraft operations and potential safety risk, as well as catastrophic effects on the airline industry, already pressured by disruption in travel cause by the Covid-19 pandemic.

1. The Order Will Cause Irreparable Harm

34. The authority to grant stays has historically been justified by the perceived need "to prevent irreparable injury to the parties or to the public."[43] This is such a case. Failure to stay the roll-out of 5G service on the 3.7 GHz band in the limited locations identified in Exhibit 1 until all attendant risks to flight operations are assessed and mitigated will impact safety risk, lead to substantial service disruptions, and subject aircraft operators and the flying public to the risk of unforeseen consequences. The airline industry has built its strong safety record on a foundation of data driven, deliberate assessment and action, often working closely with regulators to ensure that risks are fully identified, understood, and mitigated. If the Commission were to allow the unchecked, complete roll-out of 5G operations now, it will short

[40] 259 F.2d 921 (D.C. Cir. 1958). See also Washington Metropolitan Transit Comm. v. Holiday Tours, Inc., 559 F.2d 841 (D.C. Cir. 1977).

[41] See generally, In the Matter of Detariffing the Installation and Maintenance of Inside Wiring (Memorandum Opinion and Order), 2 FCC Rcd 349 (1987)

[42] *Nken v. Holder*, 556 U.S. 418, 434 (2009); *Wisconsin Gas Co. v. F.E.R.C.*, 758 F.2d 669, 673-74 (D.C. Cir. 1985).

[43] Id., at 432, citing Scripps-Howard Radio v. FCC, 316 U.S. 4, 9 (1942).

circuit this process in an area outside the Commission's area of expertise, with a palpable impact on public safety.[44]

35. A4A's member airlines and virtually all of the traveling public that rely on the dependability and safety of air carriers, will suffer irreparable harm if interference to altimeters is not addressed prior to initiation of 5G services in the 3.7 GHz frequency band in certain designated airport locations. A stay of commencement of 5G operations is necessary to avoid setting in motion a telecom system rollout prior to addressing the impact to critical safety equipment on aircraft and mitigating the documented risks associated with altimeter interference.

36. A radar altimeter beams a signal toward the earth to determine the aircraft's precise height above ground level. The device is so important that radio altimeters are typically installed redundantly in airliners, with two or more independent devices providing data for pilots and systems. Aircraft operators rely on radio altimeters for a variety of safety critical functions. Among other things, they support safe landings in low visibility conditions, including automatic landings. Further, in many aircraft the devices provide inputs to aircraft computers that manage flight control characteristics and aircraft handling, and their inputs also affect the functioning of collision avoidance systems. In addition, the outputs of radar altimeters affect the triggering of various cockpit annunciations and warnings to pilots. Thus, interference with radar altimeter signals can cause a wide variety of operational and safety impacts. It is a fact that power levels from 3.7 GHz 5G signals in urban areas exceed the extremely low power level of the altimeter signal.[45]

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[44] The FAA is currently conducting a risk assessment of the impacts of C-band interference on radar altimeters and, as recently as December 23, 2021, requested that industry stakeholders share data with the FAA to inform this assessment. *See* FAA Special Airworthiness Information Bulletin, SAIB AIR-21-18R1, *Risk of Potential Adverse Effects on Radio Altimeters* (Dec. 23, 2021).

[45] Radio altimeter transmitter power levels range from 40 milliwatts to 5 watts. By contrast, 3.7 GHz licensee 5G transmitters will operate at up to 1640 watts in urban areas and 3280

37. In considering the issues presented, it is important to recognize that the Commission does not have sole or even primary responsibility for aircraft safety. Title 49 of the United States Code specifies the broad authority of the Federal Aviation Administration ("FAA") to issue rules on aviation safety. Congress has delegated broad discretion to the FAA to prescribe regulations and standards for safety in air commerce. *See* 49 U.S.C. § 44701(a)(5). *Jiffry v. FAA*, 370 F.3d 1174 (D.C. Cir. 2004). The FCC must yield to the safety concerns of the FAA, the agency with the principal interest and duty to support air safety. The Commission's Rules and Regulations acknowledge that the FCC must address FAA safety concerns. *See*, e.g., 47 C.F.R. Part 17 (the proposed station or tower structure does not pose a hazard to aviation safety and does not create any FCC antenna clearance issues).

38. To demonstrate irreparable harm, a party must show that the harm is certain and great and of such imminence that there is a clear and present need for equitable relief.[46] A party seeking a stay, regardless of the high likelihood of success on the merits, must "demonstrate that irreparable injury is *likely* in the absence of" a stay.[47] As demonstrated by the FAA's issuance of the Directive, irreparable injury is certain to occur because the member companies of A4A (and, indeed, other industry stakeholders invested in ensuring safe flight operations as well as the FAA itself) will be forced to take unprecedented and swift action to address the wide-range of operational and safety impacts that will take place if the Commission does not issue a stay. Aircraft will not be able to land at planned destinations or flights will be canceled altogether because the FAA – the agency principally charged by Congress to regulate aviation safety – has concluded a sufficient risk of interference from 5G operations exists so as to warrant substantial changes in flight operations.

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watts in rural areas. 47 C.F.R. § 27.50(d)(1).

[46] *Wisconsin Gas Co. v. F.E.R.C.*, 758 F.2d 669, 673-74 (D.C. Cir. 1985).

[47] *Winter v. NRDC, Inc.*, 555 U.S. 7, 22 (2008) (emphasis supplied).

39. The harm that the member companies of A4A will suffer is the kind of fundamental business changes that cannot be easily undone.[48] Effective operational procedures and pilot training will need to be changed, effective immediately, not only increasing the burdens on operators and employees, but opening the door to myriad second and third-order impacts as well as negative unforeseen consequences, including but not limited to safety impacts. Flights must be rerouted or canceled altogether. This does not account for the longer-term degradation of aviation safety due to the inability to rely with confidence on the automated systems that are used daily by pilots in all operations to ensure safety of flight. The harm cannot be undone – except with great difficulty – if the wireless carriers begin operation of their new 5G cell sites, the rollout of which is already moving forward rapidly.

40. The potential damage to the airline industry alone is staggering. For example, A4A has calculated that if the restrictions of the Directive had been applied in arrears to A4A members' 2019 operations, approximately *345,000 passenger flights, 32 million passengers, and 5,400 cargo flights, as well as thousands of cockpit and aircraft personnel,* would have been impacted in the form of delayed flights, diversions, or cancellations. A4A estimates that U.S. passenger airlines would incur an additional *$1.7 billion in operating costs annually.* Separately, A4A cargo operators estimate at a minimum that the directive would have cost them *$400 million annually* resulting from the disruption to their time-sensitive operations. This does not include the downstream effects this disruption will have on customers and the U.S. economy as a whole that is still recovering from supply chain disruptions as a result of the Covid-19 pandemic. These are significant injuries that will befall the aviation industry from failure to suspend the start-up of 5G mobile operations in the vicinity of the airports listed in Exhibit 1. And this does not begin to address the losses likely to be suffered by all aspects of the American public whose lives and businesses will be ineluctably, and

[48] *FTC v. Qualcomm*, 935 F.3d 752, 756 (9th Cir. 2019)

irreparably, disrupted as a result of the Commission's actions.

41. Not only is spectrum used by altimeters compromised by the new 5G services, but also the rules violate the Communications Act of 1934 (the "Act")[49] because they permit such interference. Under Section 303(y) of the Act, the Commission is authorized to issue flexible-use licenses but only where the flexible use "would not result in harmful interference among users."[50]

42. As the aviation stakeholders have repeatedly demonstrated to the Commission, and as the FAA Directive, SAIB AIR21-18R1 and SAFO 21007 now unequivocally confirm, that essential condition cannot be satisfied here. Throughout the course of the rulemaking and most recently on reconsideration, the aviation stakeholders have demonstrated that higher powered operations in the lower portion of the C-band will endanger the operation of altimeters. The fact is that power levels from 3.7 GHz 5G license at any location in an urban area would exceed the extremely low power level of the altimeter signal sent towards the ground and could cause a catastrophic failure. The Report and Order ignored these facts, as well as reasonable alternatives such as requiring registration of the locations of new Flexible 5G Licenses to allow coordination, and which in turn would provide a solution that complies with Section 303(y) of the Act.

43. The injuries caused by the Report and Order to aviation safety are concrete and will occur when the 5G operations commence, as demonstrated by the FAA Directive and SAFO 21007. Absent an appropriate stay in the commencement of 5G operations near the airports noted in Exhibit 1, the damage caused to A4A and member airlines and the totality of the American public will be a *fait accompli* because of the effects of untested interference with radar altimeter signals. This is quintessential irreparable harm. Once the mobile carriers commence 5G operations in the 3.7 GHz frequencies, the costs and implications

[49] Pub. L. 73-416, 48 Stat. 1064.

[50] 47 U.S.C. § 303(y)(2)(C).

of turning back will likely be irreversibly compounded and made insoluble, just as the mitigating actions to address aviation safety will prudently and urgently need to be taken. In short, there will be no turning back from crossing the 5G Rubicon.

2. Aviation Stakeholders Will Prevail on the Merits Because the Commission Has Failed to Consider Important Comments Confirming the Hazards to Altimeters and Hence Aviation Safety Caused by 5G Operations in Adjacent Frequency Bands

44. As noted above, in the Report and Order, the Commission dismissed *ipse dixit* that new 5G operations in the 3.7 GHz band would negatively impact altimeters and, as a consequence, aviation safety: "We find the limits we set for the 3.7 GHz Service are sufficient to protect aeronautical services in the 4.2-4.4 GHz band. Specifically, the technical rules on power and emission limits we set for the 3.7 GHz Service and the spectral separation of 220 megahertz should offer all due protection to services in the 4.2-4.4 GHz band."[51] The Commission reached this conclusion, notwithstanding substantial, unrebutted evidence submitted by numerous parties in the aviation industry that radio altimeters might be adversely affected by the deployment of flexible use 5G operations in the 3.7-4.2 GHz Band depending upon the band alignment and the technical operational parameters that would govern flexible use deployment.[52] In the Directive, this has now been confirmed as the conclusion of the FAA, the principal federal agency entrusted with aviation safety.

45. Further, Aerospace Industries Association, ASRI, Garmin, Collins Aerospace, and others in the aviation community explained that testing of coexistence was ongoing, but would require information

[51] Report and Order, 35 FCC Rcd at 2486 (¶ 395).

[52] *See, e.g.*, Comments of ASRI, IB Docket No. 18-122 (Oct. 29, 2018); Reply Comments of ASRI, IB Docket No. 18-122 (Dec. 11, 2018); Comments of Rockwell Collins, Inc., IB Docket No. 18-122 (Mar. 31, 2018); Comments of Garmin International, IB Docket No. 18-122 (Oct. 29, 2018) ("Garmin Comments"); *see also* discussions of the AVSI Preliminary and Supplemental Reports, *infra.*

from the Commission or input from the mobile community to allow the testing to consider representative flexible use operations that were contemplated in the 3.7-4.2 GHz Band.[53] Until the very recent discussions between representatives of the aviation industry and the mobile carriers (Verizon and AT&T), there had been no such information provided to the aviation industry. Nevertheless, in the Report and Order, the Commission was content to ignore these facts and dismiss out of hand the concerns of the aviation industry.

46. Allowing the rollout of the 3.7 GHz 5G service to proceed in the face of evidence of substantial impacts to aviation safety from interference to altimeters presented during the rulemaking and without addressing the petition for reconsideration more than a year after it was filed is itself arbitrary and capricious. An administrative agency, in this case the FCC, must "address … significant comments made in the rulemaking," *Telocator Network of America v. FCC*, 691 F.2d 525, 537 (D.C. Cir. 1981), and "respond in a reasoned manner to those that raise significant problems," *City of Waukesha v. EPA*, 320 F.3d 228, 258 (D.C. Cir. 2003). *See also, American Min. Congress v. U.S. Environmental Protection Agency.*, 907 F.2d 1179, 1187-88 (D.C. Cir. 1990) (agency need respond only to those comments which, if true, would require change in agency's proposed rule). Otherwise, the opportunity to comment is meaningless. *Alabama Power Co. v. Costle*, 636 F.2d 323, 384 (D.C. Cir. 1979) (citing *Home Box Office, Inc. v. FCC,* 567 F.2d 9, 35-36 (D.C. Cir. 1976)).

47. Here, the FCC simply dismissed the concerns of the aviation community in a conclusory fashion without any reasoned analysis. This is certainly not the "'hard look' at the salient problems" required for reasoned decisionmaking. *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 851 (D.C: Cir. 1970). *See*

[53] . Written Ex Parte Presentation – Outstanding 5G Operating Models and Parameters Needed to Assess Aviation Safety, Letter from Aerospace Industries Association, et. Al, dated November 2, 2021.

also United Keetoowah Band of Cherokee Indians in Okla. v. F.C.C., 933 F.3d 728, 744 (D.C. Cir. 2019) (summary dismissal of commenters concerns does not constitute reasoned decisionmaking). See also, *Spirit Airlines v. DOT*, Case No. 19-1248 (D.C. Cir. May 21, 2021), Slip op. at 13 ("Although our review is inherently deferential, it is not satisfied by an agency decision that ignores an important aspect of the problem before it or relies upon a threadbare explanation.").

48. The agency "need not address every comment, but it must respond in a reasoned manner to those that raise significant problems." *Reytblatt v. Nuclear Regulatory Comm'n*, 105 F.3d 715, 722 (D.C.Cir.1997) (*citing Action on Smoking & Health v. CAB*, 699 F.2d 1209, 1216 (D.C.Cir.1983), *supplemented* 713 F.2d 795 (1983)). In this case, the Commission's failure to address record evidence of harmful interference to altimeters submitted by the aviation industry is fatal to the Commission's position that there is no harmful interference because the evidence challenges a fundamental aspect of the agency decision. *See Environmental Health Trust v. FCC*, 9 F.4th 893, 906-07 (D.C. Cir. 2021) (And while "[a]n agency is not obliged to respond to every comment, only those that can be thought to challenge a fundamental premise," *MCI WorldCom, Inc. v. FCC*, 209 F.3d 760, 765 (D.C. Cir. 2000), the studies in the record to which Petitioners point do challenge a fundamental premise of the Commission's decision.). What could be a more significant problem than possible harm to systems that allow for safe landing operations for aircraft? The arbitrary and capricious standard demands that the agency "examine the relevant data and articulate a satisfactory explanation for its action including a rational connection." *United Keetoowah Band supra.,* 933 F.3d at 738 , *citing Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Ins. Co.,* 463 U.S. 29, 43 (1983). Here, the Commission failed to provide even minimal clarity as to how it has dismissed the record evidence of interference to radio altimeters and consequential impacts on aviation safety, which is itself arbitrary and capricious. "Although mathematical precision is, of course, impossible, something more than the Commission's customary recitals, 'completely opaque to judicial review,' must be provided."

Central Florida Enterprises, Inc. v. F.C.C., 598 F.2d 37, 60-61 (D.C. Cir. 1978).

49. The Report and Order failed to address the evidence of serious harm to aviation because of the interference caused to altimeters by 3.7 GHz high-powered mobile transmissions. Despite repeated submissions of evidence by A4A and other in the aviation community demonstrating a serious flaw in the Report and Order, the Commission continues to ignore the problem of altimeter interference. By letting the clock run out before initiation of operations, despite substantial evidence of interference caused by 3.7 GHz licensee operations, including the FAA's Directive, the Commission is creating a "*fait accompli*" for the benefit of the commercial wireless interests at the expense of aviation safety. Such action is arbitrary and capricious. *Echo Star Satellite, L.L.C. v. FCC*, 704 F.3d 992, 1002 (D.C. Cir. 2013) (concurring opinion of J. Edwards) (FCC adopted the disputed encoding rules here to serve the interests of the cable industry and consumer electronics manufacturers in almost total disregard of the interests of satellite carriers). This purposeful delay until the 5G carriers initiate their operations on C-band frequencies amounts to the Commission attempting to "avoid judicial review" through "a sort of administrative law shell game," a past practice by the Commission for which it has been sternly admonished. *AT&T v. F.C.C.*, 978 F.2d 727, 731-32 (D.C. Cir. 1992).

50. By ignoring the record evidence of harmful interference to radio altimeters, the Commission has failed to give due consideration to consider its own mandate regarding the implications for public safety. "Congress created the Commission for the purpose of, among other things, "promoting safety of life and property through the use of wire and radio communications." 47 U.S.C. § 151. So the Commission is "required to consider public safety by * * * its enabling act." *Mozilla Corporation v. FCC*, 940 F.3d 1, 59 (D.C. Cir. 2019), *citing Nuvio Corp. v. FCC*, 473 F.3d 302, 307 (D.C. Cir. 2006). Nineteen months since the filing of the aviation stakeholders' petition for partial reconsideration pointing out these serious aviation safety shortcomings in the Report and Order, the Commission has not yet corrected its error.

See also AT&T Services, Inc. v. F.C.C., Case No. 20-1190 (D.C. Cir. Dec. 28, 2021), Slip. Op. at 23.

51. The aviation stakeholders will ultimately prevail on the merits of its argument that the FCC has failed to consider serious record evidence of harmful interference to radio altimeters.

c. A Stay Is in the Public Interest

52. In addition to irreparable harm and likelihood of success on the merits, grant of a stay will harm neither the public interest nor third parties. Even if that were not the case, the harm that other parties may endure because of imposing a stay is outweighed by the irreparable injury that the aviation industry would sustain absent a stay and tilts the balance in favor of granting the stay.[54]

53. The public interest will not be harmed. At issue here is not only the public interest in more rapid service through 5G technology, but also more importantly the public interest in aviation safety. A4A does not seek to stop completely the initiation of service for 3.7 GHz 5G licenses. It is asking for a stay of initiation of operations only near the airport locations listed in Exhibit 1, which is sufficient to address the Directive.

d. Harm to Third Parties will be Minimal

54. AT&T and Verizon will incur costs by the stay, but certainly not as much as the airline industry if it must reroute or cancel the thousands of flights that A4A has estimated will be affected. The disruptions to the 3.7 GHz licensees will not be to existing operations, but rather to the rollout of a new service. Thus, any adverse impact will entail some delay in implementation of the new service, but will not impact ongoing operations. More importantly, members of the public are not likely to be affected at all by such delay. By contrast, virtually the entirety of the American public will be significantly and adversely affected if the January 5th date is not stayed. Thus, there is no harm to third parties which

[54] Iowa Utils. Bd. v. F.C.C., 109 F.3d 418, 426 (8th Cir. 1996). See also Winter, supra.

could preclude grant of the stay.

55. Accordingly, the Commission must grant the instant request and stay the initiation of 5G service in the 3.7 GHz band in the locations set out in Exhibit 1.

IV. Conclusion

56. A4A has demonstrated the substantial harm to the airline industry that will result from compliance with the Directive, which is being forced on the aviation community and the traveling public by the unwillingness of the Commission to require the mobile carriers to accept a reasonably moderate, tailored solution.

57. Further, a stay is in the public interest. Although the public may have an interest in the eventual arrival of advanced 5G services, it also has an equal interest in aviation safety. No third parties would be harmed. Hence, there is no harm to the public interest by the rollout of 5G service in the 3.7 GHz band in certain locations.

58. The stay requested in this Emergency Petition meets the *Virginia Petroleum Jobbers* test. The Commission should grant the instant Emergency Petition.

59. WHEREFORE, in light of the foregoing, A4A respectfully requests that the Commission grant this Petition and suspend the inauguration of 3.7 GHz Flexible License service as set forth above.

Respectfully submitted,

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Its Counsel

Dated: December 30, 2021

Exhibit 1

Airport	*Airport Name*	*City*	*State*
ABE	LEHIGH VALLEY INTL	ALLENTOWN	PENNSYLVANIA
ACK	NANTUCKET MEML	NANTUCKET	MASSACHUSETTS
ACY	ATLANTIC CITY INTL	ATLANTIC CITY	NEW JERSEY
AFW	FORT WORTH ALLIANCE	FORT WORTH	TEXAS
ALB	ALBANY INTL	ALBANY	NEW YORK
ANB	ANNISTON RGNL	ANNISTON	ALABAMA
AND	ANDERSON RGNL	ANDERSON	SOUTH CAROLINA
AUS	AUSTIN-BERGSTROM INTL	AUSTIN	TEXAS
AVP	WILKES-BARRE/SCRANTON INTL	WILKES-BARRE/SCRANTON	PENNSYLVANIA
BDL	BRADLEY INTL	WINDSOR LOCKS	CONNECTICUT
BED	LAURENCE G HANSCOM FLD	BEDFORD	MASSACHUSETTS
BFI	BOEING FLD/KING COUNTY INTL	SEATTLE	WASHINGTON
BFL	MEADOWS FLD	BAKERSFIELD	CALIFORNIA
BHM	BIRMINGHAM-SHUTTLESWORTH INTL	BIRMINGHAM	ALABAMA
BKL	BURKE LAKEFRONT	CLEVELAND	OHIO
BLV	SCOTT AFB/MIDAMERICA ST LOUIS	BELLEVILLE	ILLINOIS
BNA	NASHVILLE INTL	NASHVILLE	TENNESSEE
BOS	GENERAL EDWARD LAWRENCE LOGAN INTL	BOSTON	MASSACHUSETTS
BRO	BROWNSVILLE/SOUTH PADRE ISLAND INTL	BROWNSVILLE	TEXAS
BUR	BOB HOPE	BURBANK	CALIFORNIA
CAK	AKRON-CANTON RGNL	AKRON	OHIO
CLE	CLEVELAND-HOPKINS INTL	CLEVELAND	OHIO
CLT	CHARLOTTE/DOUGLAS INTL	CHARLOTTE	NORTH CAROLINA
CMH	JOHN GLENN COLUMBUS INTL	COLUMBUS	OHIO
CPS	ST LOUIS DOWNTOWN	CAHOKIA/ST LOUIS	ILLINOIS
CVG	CINCINNATI/NORTHERN KENTUCKY INTL	COVINGTON	KENTUCKY
DAB	DAYTONA BEACH INTL	DAYTONA BEACH	FLORIDA
DAL	DALLAS LOVE FLD	DALLAS	TEXAS
DFW	DALLAS-FORT WORTH INTL	DALLAS-FORT WORTH	TEXAS
DTW	DETROIT METRO WAYNE COUNTY	DETROIT	MICHIGAN
EFD	ELLINGTON	HOUSTON	TEXAS
EWR	NEWARK LIBERTY INTL	NEWARK	NEW JERSEY
FAT	FRESNO YOSEMITE INTL	FRESNO	CALIFORNIA
FLL	FORT LAUDERDALE/HOLLYWOOD INTL	FORT LAUDERDALE	FLORIDA
FNT	BISHOP INTL	FLINT	MICHIGAN
FRG	REPUBLIC	FARMINGDALE	NEW YORK
FTW	FORT WORTH MEACHAM INTL	FORT WORTH	TEXAS
GFL	FLOYD BENNETT MEML	GLENS FALLS	NEW YORK
GNV	GAINESVILLE RGNL	GAINESVILLE	FLORIDA
GSP	GREENVILLE SPARTANBURG INTL	GREER	SOUTH CAROLINA
GYH	DONALDSON FLD	GREENVILLE	SOUTH CAROLINA
GYY	GARY/CHICAGO INTL	GARY	INDIANA
HOU	WILLIAM P HOBBY	HOUSTON	TEXAS
HPN	WESTCHESTER COUNTY	WHITE PLAINS	NEW YORK
HRL	VALLEY INTL	HARLINGEN	TEXAS
HVN	TWEED-NEW HAVEN	NEW HAVEN	CONNECTICUT
HYA	CAPE COD GATEWAY	HYANNIS	MASSACHUSETTS
IAH	GEORGE BUSH INTCNTL/HOUSTON	HOUSTON	TEXAS
ILG	NEW CASTLE	WILMINGTON	DELAWARE

IND	INDIANAPOLIS INTL	INDIANAPOLIS	INDIANA
ISP	LONG ISLAND MAC ARTHUR	NEW YORK	NEW YORK
ITH	ITHACA TOMPKINS INTL	ITHACA	NEW YORK
IWA	PHOENIX-MESA GATEWAY	PHOENIX	ARIZONA
JAX	JACKSONVILLE INTL	JACKSONVILLE	FLORIDA
JFK	JOHN F KENNEDY INTL	NEW YORK	NEW YORK
LAL	LAKELAND LINDER INTL	LAKELAND	FLORIDA
LAS	HARRY REID INTL	LAS VEGAS	NEVADA
LAW	LAWTON-FORT SILL RGNL	LAWTON	OKLAHOMA
LAX	LOS ANGELES INTL	LOS ANGELES	CALIFORNIA
LBE	ARNOLD PALMER RGNL	LATROBE	PENNSYLVANIA
LBX	TEXAS GULF COAST RGNL	ANGLETON/LAKE JACKSON	TEXAS
LCK	RICKENBACKER INTL	COLUMBUS	OHIO
LGA	LAGUARDIA	NEW YORK	NEW YORK
LGB	LONG BEACH (DAUGHERTY FLD)	LONG BEACH	CALIFORNIA
LIT	BILL AND HILLARY CLINTON NTL/ADAMS FLD	LITTLE ROCK	ARKANSAS
LNS	LANCASTER	LANCASTER	PENNSYLVANIA
LUK	CINCINNATI MUNI/LUNKEN FLD	CINCINNATI	OHIO
MCI	KANSAS CITY INTL	KANSAS CITY	MISSOURI
MCO	ORLANDO INTL	ORLANDO	FLORIDA
MDT	HARRISBURG INTL	HARRISBURG	PENNSYLVANIA
MDW	CHICAGO MIDWAY INTL	CHICAGO	ILLINOIS
MFE	MC ALLEN MILLER INTL	MC ALLEN	TEXAS
MIA	MIAMI INTL	MIAMI	FLORIDA
MIE	DELAWARE COUNTY RGNL	MUNCIE	INDIANA
MKC	CHARLES B WHEELER DOWNTOWN	KANSAS CITY	MISSOURI
MKE	GENERAL MITCHELL INTL	MILWAUKEE	WISCONSIN
MLB	MELBOURNE ORLANDO INTL	MELBOURNE	FLORIDA
MQY	SMYRNA	SMYRNA	TENNESSEE
MRY	MONTEREY RGNL	MONTEREY	CALIFORNIA
MSP	MINNEAPOLIS-ST PAUL INTL/WOLD-CHAMBERLAIN	MINNEAPOLIS	MINNESOTA
MSV	SULLIVAN COUNTY INTL	MONTICELLO	NEW YORK
MSY	LOUIS ARMSTRONG NEW ORLEANS INTL	NEW ORLEANS	LOUISIANA
MVY	MARTHA'S VINEYARD	VINEYARD HAVEN	MASSACHUSETTS
OAK	METRO OAKLAND INTL	OAKLAND	CALIFORNIA
OCF	OCALA INTL-JIM TAYLOR FLD	OCALA	FLORIDA
OGD	OGDEN-HINCKLEY	OGDEN	UTAH
OKC	WILL ROGERS WORLD	OKLAHOMA CITY	OKLAHOMA
ONT	ONTARIO INTL	ONTARIO	CALIFORNIA
ORD	CHICAGO O'HARE INTL	CHICAGO	ILLINOIS
ORH	WORCESTER RGNL	WORCESTER	MASSACHUSETTS
PAE	SNOHOMISH COUNTY (PAINE FLD)	EVERETT	WASHINGTON
PBI	PALM BEACH INTL	WEST PALM BEACH	FLORIDA
PDX	PORTLAND INTL	PORTLAND	OREGON
PHL	PHILADELPHIA INTL	PHILADELPHIA	PENNSYLVANIA
PHX	PHOENIX SKY HARBOR INTL	PHOENIX	ARIZONA
PIE	ST PETE-CLEARWATER INTL	ST PETERSBURG-CLEARWATER	FLORIDA
PIT	PITTSBURGH INTL	PITTSBURGH	PENNSYLVANIA
POU	HUDSON VALLEY RGNL	POUGHKEEPSIE	NEW YORK
PTK	OAKLAND COUNTY INTL	PONTIAC	MICHIGAN
PVD	RHODE ISLAND TF GREEN INTL	PROVIDENCE	RHODE ISLAND
PVU	PROVO MUNI	PROVO	UTAH

RDG	READING RGNL/CARL A SPAATZ FLD	READING	PENNSYLVANIA
RDU	RALEIGH-DURHAM INTL	RALEIGH/DURHAM	NORTH CAROLINA
RME	GRIFFISS INTL	ROME	NEW YORK
ROC	FREDERICK DOUGLASS - GREATER ROCHESTER INTL	ROCHESTER	NEW YORK
SAN	SAN DIEGO INTL	SAN DIEGO	CALIFORNIA
SAT	SAN ANTONIO INTL	SAN ANTONIO	TEXAS
SBA	SANTA BARBARA MUNI	SANTA BARBARA	CALIFORNIA
SBD	SAN BERNARDINO INTL	SAN BERNARDINO	CALIFORNIA
SBP	SAN LUIS COUNTY RGNL	SAN LUIS OBISPO	CALIFORNIA
SCK	STOCKTON METRO	STOCKTON	CALIFORNIA
SEA	SEATTLE-TACOMA INTL	SEATTLE	WASHINGTON
SFB	ORLANDO SANFORD INTL	ORLANDO	FLORIDA
SFO	SAN FRANCISCO INTL	SAN FRANCISCO	CALIFORNIA
SGJ	NORTHEAST FLORIDA RGNL	ST AUGUSTINE	FLORIDA
SJC	NORMAN Y MINETA SAN JOSE INTL	SAN JOSE	CALIFORNIA
SLC	SALT LAKE CITY INTL	SALT LAKE CITY	UTAH
SLE	MCNARY FLD	SALEM	OREGON
SMF	SACRAMENTO INTL	SACRAMENTO	CALIFORNIA
SMX	SANTA MARIA PUB/CAPT G ALLAN HANCOCK FLD	SANTA MARIA	CALIFORNIA
SNA	JOHN WAYNE/ORANGE COUNTY	SANTA ANA	CALIFORNIA
STC	ST CLOUD RGNL	ST CLOUD	MINNESOTA
STL	ST LOUIS LAMBERT INTL	ST LOUIS	MISSOURI
STS	CHARLES M SCHULZ - SONOMA COUNTY	SANTA ROSA	CALIFORNIA
SUS	SPIRIT OF ST LOUIS	ST LOUIS	MISSOURI
SWF	NEW YORK STEWART INTL	NEW YORK	NEW YORK
SYR	SYRACUSE HANCOCK INTL	SYRACUSE	NEW YORK
TCL	TUSCALOOSA NTL	TUSCALOOSA	ALABAMA
TEB	TETERBORO	TETERBORO	NEW JERSEY
TIX	SPACE COAST RGNL	TITUSVILLE	FLORIDA
TPA	TAMPA INTL	TAMPA	FLORIDA
TTN	TRENTON MERCER	TRENTON	NEW JERSEY
VCV	SOUTHERN CALIFORNIA LOGISTICS	VICTORVILLE	CALIFORNIA
YIP	WILLOW RUN	DETROIT	MICHIGAN
YNG	YOUNGSTOWN-WARREN RGNL	YOUNGSTOWN/WARREN	OHIO

U.S. Department of Transportation

1200 New Jersey Ave. S.E.
Washington, D.C. 20590

December 1, 2020

Adam Candeub
Deputy Assistant Secretary of Commerce for Communications and Information, Performing the Delegated Duties of the Assistant Secretary of Commerce for Communications and Information
National Telecommunications and Information Administration
1401 Constitution Ave., N.W.
Washington, D.C. 20230

Re: ***Expanding Flexible Use of the 3.7 to 4.2 GHz Band***
FCC Docket Nos. GN 18-122, IB 20-205, GN 20-305

Dear Mr. Candeub:

The U.S. Department of Transportation (Department or DOT) and the Federal Aviation Administration (FAA), an operating administration of DOT, respectfully request that the National Telecommunications and Information Administration (NTIA) engage with the Federal Communications Commission (FCC or Commission) to defer further action in the above-referenced proceeding, particularly with respect to the planned December 8, 2020 auction of spectrum within the 3.7–4.2 GHz spectrum band (the 3.7 GHz band). DOT recognizes the significance of this FCC proceeding, and we agree with the importance of making additional spectrum available for commercial purposes, particularly to foster the development of 5G technology. Nonetheless, as the Executive Branch expert on transportation safety, DOT is concerned about the safety impact upon aviation that may result from FCC's action. Recent testing and analyses reveal the potential for harmful interference to radar altimeters installed in thousands of commercial transport aircraft, general aviation aircraft, business jets, and helicopters. Given the potential scope and complexity of this safety issue, a deferral of the planned auction would enable the FAA to conduct a comprehensive safety risk assessment and to work with FCC and industry stakeholders to identify potential mitigations.

Harmful interference can interrupt or significantly degrade radar altimeter functions during critical phases of flight—precluding radar altimeter-based terrain alerts and low-visibility approach and landing operations. Numerous interdependent aircraft systems use radar altimeter data to reduce the risk of fatal aviation accidents. As an example, the Terrain Awareness Warning System (TAWS) has effectively eliminated controlled flight into terrain (CFIT), which occurs when an aircraft under the pilot's control is unintentionally flown into the ground, a mountain, a body of water, or other obstacles. TAWS is therefore considered to be one of the greatest commercial aviation safety improvements of the past 30 years. TAWS with radar altimeters are used in many turbine-powered aircraft operating under 14 CFR Parts 91, 121, and

135. Radar altimeters also provide input to traffic collision avoidance systems (TCAS) to preclude distractions during critical phases of flight.

There are also operational consequences at stake in this proceeding. Our Nation's air transportation system depends upon the use of radar altimeters to enable low-visibility operations that are critical to sustaining National Airspace System (NAS) capacity demands. Category II/III Instrument Landing Systems are the global standard for aircraft precision approach and landing in low-visibility operations. Aircraft use radar altimeter data to define the lowest height where the pilot must decide if the aircraft can safely land, or whether the pilot must instead initiate a missed approach. "Autoland" systems, which can fully automate an aircraft's landing phase, are a key component of Category II/III operations, and are dependent upon radar altimeter data. Furthermore, radar altimeter interference degradation can occur without pilot awareness, increasing the safety risk.

The loss of these capabilities would have significant adverse effects on the safety and efficiency of the NAS, as well as our Nation's mobility and economy. DOT is not alone in identifying these concerns, and efforts have been ongoing to raise these issues during the course of FCC's proceedings on the 3.7 GHz band:

- In October 2019, the FAA partially funded the Aerospace Vehicle Systems Institute (AVSI) to conduct preliminary bench tests to determine the interference impact from proposed 3.7-3.98 GHz 5G signals on a range of radio altimeter models. The results filed in the docket showed radar altimeter performance degradation for 5G signals, even at the 3.7 GHz band edge, with one widely deployed altimeter performing significantly worse than most others.
- In May 2020, the Aerospace Industries Association (AIA) formally notified FCC of aviation safety issues associated with the Commission's decision in a Petition for Reconsideration.
- In July 2020, an industry report entitled "Helicopter Air Ambulance RF Interference Report" was submitted to FCC. The study used actual heliport locations, published 5G characteristics, and FCC-specified power limits to demonstrate that harmful interference to radar altimeters can be expected to occur as a result of FCC's decision.
- In October 2020, RTCA published a technical report developed by aviation experts, including representatives from the FAA, concluding that 5G operations in the 3.7–3.98 GHz band may create harmful interference to radar altimeters that would significantly degrade or completely interrupt their operation during critical phases of flight. The report also notes that this could potentially affect tens of thousands of aircraft. The report based its conclusions on the comprehensive interference testing done by AVSI, which clearly demonstrated that the allocated 220 MHz guard band is insufficient. This is the same critical issue identified recently in France, where the auctioned frequencies are only up to 3.8 GHz, and where the 400 MHz guard band was nevertheless determined to be insufficient, and required further federal action to impose mitigations.
- As recently as November 17, 2020, numerous key aviation stakeholders, including the Aerospace Industries Association, Airlines for America, National Business Aviation Association, and Helicopter Association International, sent a joint letter to the Chairmen and Ranking Members of both the House Committee on Transportation and Infrastructure (House T&I Committee) and Senate Committee on Commerce, Science, and Transportation, expressing their concerns with the potential safety impact of this upcoming auction.

We recognize that FCC Chairman Pai, in a January 14, 2020 letter, assured House T&I Committee Chairman Peter A. Defazio that "[a]ny actions the Commission takes regarding [the 3.7 GHz] band will be carefully designed so that aircraft are able to use altimeters in a continuous and uninterrupted manner." DOT appreciates and agrees with Chairman Pai's aims in ensuring transportation safety. Nonetheless, FCC's path in this proceeding is insufficient to address our concerns. In the Department's view, a comprehensive risk assessment and an analysis of potential mitigation options are needed to understand the safety and economic ramifications of 5G network operation for these aircraft systems and for aviation operations. The risk assessment should consider factors such as:

- The specific number of and type of aircraft potentially affected;
- The make(s) and model(s) of radar altimeters installed in aircraft, and their susceptibility to this new interference source;
- The steps needed to train flight crews to recognize risk indications, and to take proper corrective action when a radar altimeter's function is misleading or inhibited;
- The operating limitations that could be imposed on these spectrum deployments to prevent or to mitigate interference; and
- Information based on mitigations that other regulators and industries have assessed and planned regarding potential wireless provider antenna, power, and siting mitigations, as well as radar altimeter standards to improve spectrum usage over the long term.

Of course, it is also important to ensure that the consideration of these issues includes the input of the wireless industry. In particular, the FAA requires information about where and when 5G networks will be installed, including specific transmitter locations before they are installed and operational, to assess the effects and corresponding mitigations.

DOT has already begun to assess the safety implications of this proceeding, but in light of the complex technical issues and critical safety concerns involved here, additional time is needed. We therefore believe that the Commission should pause this proceeding, and defer the upcoming auction, until we fully understand the safety implications, and how those implications can be addressed. This would also help to provide additional certainty to the wireless industry; currently, without an adequate understanding of the risk, they could make investments without knowing if additional operational constraints may need to be imposed to ensure aviation safety. As noted above, the French National Frequency Agency is imposing retroactive restrictions upon their already-auctioned 5G spectrum based on the concerns raised by the October RTCA Report, even though they are implementing 5G only up to 3800 MHz. Such retroactive restrictions are highly disruptive and inefficient.

We understand that new commercial deployment in the 3.7 GHz band could occur as early as 2022. In the event that 5G network implementation moves forward without addressing these safety issues, the aviation industry needs a considerable transition period to develop updated radar altimeter performance standards; to design, manufacture, and certify new avionics; and then to integrate and install that equipment into aircraft and helicopters. Given the scope of the safety risk, and based upon our current knowledge, it is unclear what measures will be necessary to ensure safe operations in the NAS, or how long it will take to implement such measures. Depending upon the results of further analysis, it may be appropriate to place restrictions on

certain types of operations, which would reduce access to core airports in the U.S. and, thus, reduce the capacity and efficiency of the NAS. We also expect that the cost of replacement or retrofit of radar altimeters will be substantial. The Commission does not appear to have taken these factors into account in its decision-making process.

We appreciate your assistance in this matter and ask that NTIA submit this letter for filing on FCC's public docket. We look forward to the opportunity to reengage with FCC, NTIA, and other key stakeholders on the issues in this proceeding and to develop a workable solution.

Sincerely,

Steven G. Bradbury
General Counsel (and performing the functions and duties of Deputy Secretary)

Steve Dickson
Administrator
Federal Aviation Administration

Renewed Amendment Number 1 on February 22, 2022.

SAR Submitted by: Transnuclear, Inc., now TN Americas LLC.

Renewal SAR Submitted by: TN Americas LLC.

SAR Title: Final Safety Analysis Report for the TN–68 Dry Storage Cask.

Docket Number: 72–1027.

Certificate Expiration Date: May 28, 2020.

Renewed Certificate Expiration Date: May 28, 2060.

Model Number: TN–68.

* * * * *

Dated: November 29, 2021.

For the Nuclear Regulatory Commission.

Daniel H. Dorman,

Executive Director for Operations.

[FR Doc. 2021–26628 Filed 12–8–21; 8:45 am]

BILLING CODE 7590–01–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2021–0953; Project Identifier AD–2021–01169–T; Amendment 39–21810; AD 2021–23–12]

RIN 2120–AA64

Airworthiness Directives; Transport and Commuter Category Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; request for comments.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for all transport and commuter category airplanes equipped with a radio (also known as radar) altimeter. This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7–3.98 GHz frequency band (5G C-Band). This AD requires revising the limitations section of the existing airplane/aircraft flight manual (AFM) to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band interference as identified by Notices to Air Missions (NOTAMs). The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective December 9, 2021.

The FAA must receive comments on this AD by January 24, 2022.

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- *Federal eRulemaking Portal:* Go to *https://www.regulations.gov.* Follow the instructions for submitting comments.
- *Fax:* 202–493–2251.
- *Mail:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.
- *Hand Delivery:* Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Examining the AD Docket

You may examine the AD docket at *https://www.regulations.gov* by searching for and locating Docket No. FAA–2021–0953; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The street address for the Docket Operations is listed above.

FOR FURTHER INFORMATION CONTACT: Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712–4137; phone: 817–222–5390; email: *operationalsafety@faa.gov*.

SUPPLEMENTARY INFORMATION:

Background

In March 2020, the United States Federal Communications Commission (FCC) adopted final rules authorizing flexible use of the 3.7–3.98 GHz band for next generation services, including 5G and other advanced spectrum-based services.[1] Pursuant to these rules, C-Band wireless broadband deployment is permitted to occur in phases with the opportunity for operations in the lower 100 megahertz of the band (3.7–3.8 GHz) in 46 markets beginning as soon as December 5, 2021; however, the FAA does not expect actual deployment to commence until January 5, 2022. This AD refers to ''5G C-Band'' interference, but wireless broadband technologies, other than 5G, may use the same frequency band.[2] These other uses of the same frequency band are within the scope of this AD since they would introduce the same risk of radio altimeter interference as 5G C-Band.

In April 2020, RTCA formed a 5G Task Force, including members from RTCA, the FAA, aircraft and radio altimeter manufacturers, European Organisation for Civil Aviation Equipment (EUROCAE), industry organizations, and operators, to perform ''a quantitative evaluation of radar altimeter performance regarding RF interference from expected 5G emissions in the 3.7–3.98 GHz band, as well as a detailed assessment of the risk of such interference occurring and impacting aviation safety.'' [3] Based on the work of the task force, RTCA published a report which concludes that there is ''a major risk that 5G telecommunications systems in the 3.7–3.98 GHz band will cause harmful interference to radar altimeters on all types of civil aircraft—including commercial transport airplanes; business, regional, and general aviation airplanes; and both transport and general aviation helicopters.'' [4]

The report further concludes that the likelihood and severity of radio frequency interference increases for operations at lower altitudes. That interference could cause the radio altimeter to either become inoperable or present misleading information, and/or also affect associated systems on civil aircraft. The RTCA report refers to FCC Report and Order (R&O) FCC 20–22,[5] which identifies radio frequencies and power level conditions for the new C-Band services. The RTCA report identified the possibility of interference from both wireless emitters (on base stations, for example) as well as onboard user handsets. The RTCA report and conclusions remain under review, including by federal spectrum regulators. The FAA risk assessment included consideration of the RTCA report, public comments to the RTCA report, and analyses from radio altimeter manufacturers and aircraft manufacturers in support of the safety risk determination. The analyses FAA considered were consistent with RTCA's conclusions pertaining to radio altimeter interference from C-Band

[1] The FCC's rules did not make C-Band wireless broadband available in Alaska, Hawaii, and the U.S. Territories.

[2] The regulatory text of the AD uses the term ''5G C-Band'' which, for purposes of this AD, has the same meaning as ''5G'', ''C-Band'' and ''3.7–3.98 GHz''

[3] RTCA Paper No. 274–20/PMC–2073, Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Options, dated October 7, 2020 (RTCA Paper No. 274–20/PMC–2073), page i. This document is available in Docket No. FAA–2021–0953, and at *https://www.rtca.org/wp-content/uploads/2020/10/SC-239-5G-Interference-Assessment-Report_274-20-PMC-2073_accepted_changes.pdf.*

[4] RTCA Paper No. 274–20/PMC–2073, page i.

[5] FCC Report and Order (R&O) FCC 20–22 in the Matter of Expanding Flexible Use of the 3.7–4.2 GHz Band, adopted February 28, 2020, and released March 3, 2020. This document is available in Docket No. FAA–2021–0953, and at *https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0.*

emissions. The FAA determined that, at this time, no information has been presented that shows radio altimeters are not susceptible to interference caused by C-Band emissions permitted in the United States.

Additionally, the deployment of C-Band wireless broadband networks is occurring globally. In certain countries, deployment has already occurred in C-Band frequencies. In some countries, temporary technical, regulatory, and operational mitigations on C-Band systems have been implemented while aviation authorities complete their safety assessments. Under the FCC rules adopted in 2020, base stations in rural areas of the United States are permitted to emit at higher levels in comparison to other countries which may affect radio altimeter equipment accuracy and reliability.

The radio altimeter is an important aircraft instrument, and its intended function is to provide direct height-above-terrain/water information to a variety of aircraft systems. Commercial aviation radio altimeters operate in the 4.2–4.4 GHz band, which is separated by 220 megahertz from the C-Band telecommunication systems in the 3.7–3.98 GHz band. The radio altimeter is more precise than a barometric altimeter and for that reason is used where aircraft height over the ground needs to be precisely measured, such as autoland or other low altitude operations. The receiver on the radio altimeter is typically highly accurate, however it may deliver erroneous results in the presence of out-of-band radiofrequency emissions from other frequency bands. The radio altimeter must detect faint signals reflected off the ground to measure altitude, in a manner similar to radar. Out-of-band signals could significantly degrade radio altimeter functions during critical phases of flight, if the altimeter is unable to sufficiently reject those signals.

Many operators need to be able to land in low visibility conditions. These operators employ specially certified equipment and flightcrew training in order to be able to fly closer to the ground during approach in instrument conditions, in some cases all the way through the landing phase, without visual reference to the runway environment. These operations can only be conducted with reference to actual height above the ground, as measured by a radio altimeter.

Additionally, automatic and/or manual flight guidance systems on airplanes facilitate low visibility operations and rely on accurate radio altimeter inputs. These inputs determine when and where the aircraft flares for landing, when power reductions are made for landing, and when automated crosswind controls and other control inputs are made. Anomalous (missing or erroneous) radio altimeter inputs to these systems may cause the aircraft to be maneuvered in an unexpected or hazardous manner during the final stages of approach and landing, and may not be detectable by the pilot in time to maintain continued safe flight and landing. Inaccurate radio altimeter data can result in pilots not trusting their instruments, eroding the foundation on which all instrument flight training is built.

Although the FAA has determined the operations immediately at risk are those requiring a radio altimeter to land in low visibility conditions, a wide range of other automated safety systems rely on radio altimeter data. Harmful interference to the radio altimeter could cause these systems to operate in an unexpected way. The FAA continues to work with inter-agency and industry stakeholders to collect data on potential effects to these systems to determine whether additional mitigations are necessary. The FAA determined, however, that mandatory action is not immediately required for these systems.

The FAA plans to use data provided by telecommunications providers to determine which airports within the United States have or will have C-Band base stations or other devices that could potentially impact airplane systems. NOTAMs will be issued, as necessary, to state the specific airports where the data from a radio altimeter may be unreliable due to the presence of 5G C-Band wireless broadband signals.[6] For this reason, this AD requires flight manual limitations that prohibit certain operations requiring radio altimeter data at locations that will be identified by NOTAMs. Due to the dynamic nature of both the base station activation and the ongoing process of identifying the resulting affected airspace, including potential consideration for variability in C-Band deployment conditions such as radiated power levels and locations, the FAA has determined that NOTAMs are the best means to communicate changes in restrictions at affected airports.

Finally, the FAA notes that in accordance with paragraph (h) of this AD, any person may propose and request FAA approval of an alternative method of compliance (AMOC). The proposed AMOC must include specific conditions that would address the unsafe condition (*e.g.,* by providing information substantiating that certain aircraft or altimeter models are not susceptible to C-Band radiofrequency interference).

[6] The FAA's process for issuing NOTAMs is described in FAA Order 7930.2S, *Notices to Air Missions (NOTAM),* December 2, 2021.

FAA's Determination

The FAA is issuing this AD because the agency has determined the unsafe condition as described previously is likely to exist or develop in transport and commuter category airplanes with a radio altimeter as part of their type design.

AD Requirements

This AD requires revising the limitations section of the existing AFM to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band wireless broadband signals as identified by NOTAM. These limitations could prevent dispatch of flights to certain locations with low visibility, and could also result in flight diversions.

Compliance With AFM Revisions

Section 91.9 prohibits any person from operating a civil aircraft without complying with the operating limitations specified in the AFM. FAA regulations also require operators to furnish pilots with any changes to the AFM (14 CFR 121.137) and pilots in command to be familiar with the AFM (14 CFR 91.505).

Interim Action

The FAA considers this AD to be an interim action. If final action is later identified, the FAA might consider further rulemaking.

Justification for Immediate Adoption and Determination of the Effective Date

Section 553(b)(3)(B) of the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq.*) authorizes agencies to dispense with notice and comment procedures for rules when the agency, for ''good cause,'' finds that those procedures are ''impracticable, unnecessary, or contrary to the public interest.'' Under this section, an agency, upon finding good cause, may issue a final rule without providing notice and seeking comment prior to issuance. Further, section 553(d) of the APA authorizes agencies to make rules effective in less than thirty days, upon a finding of good cause.

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies forgoing notice and comment prior to adoption of this

rule because radio altimeter anomalies that are undetected by the aircraft automation or pilot, particularly close to the ground (*e.g.,* landing flare), could lead to loss of continued safe flight and landing. The urgency is based on C-Band wireless broadband deployment, which is expected to occur in phases with operations beginning as soon as January 5, 2022. Accordingly, notice and opportunity for prior public comment are impracticable and contrary to the public interest pursuant to 5 U.S.C. 553(b)(3)(B).

In addition, the FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment effective in less than 30 days, for the same reasons the FAA found good cause to forgo notice and comment.

Comments Invited

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under **ADDRESSES**. Include ''Docket No. FAA–2021–0953 and Project Identifier AD–2021–01169–T'' at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to *https://www.regulations.gov,* including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

Confidential Business Information

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as ''PROPIN.'' The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712–4137; phone: 817–222–5390; email: *operationalsafety@faa.gov.* Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Regulatory Flexibility Act

The requirements of the Regulatory Flexibility Act (RFA) do not apply when an agency finds good cause pursuant to 5 U.S.C. 553 to adopt a rule without prior notice and comment. Because the FAA has determined that it has good cause to adopt this rule without notice and comment, RFA analysis is not required.

Impact on Intrastate Aviation in Alaska

For the reasons discussed above, this AD will not affect intrastate aviation in Alaska.

Costs of Compliance

The FAA estimates that this AD affects 6,834 airplanes of U.S. registry. The FAA estimates the following costs to comply with this AD:

ESTIMATED COSTS

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
AFM revision	1 work-hour × $85 per hour = $85	$0	$85	$580,890

As previously discussed, there may be other impacts to aviation; however there remains uncertainty as to cost due to various factors such as which airports within the United States have, or will have, base stations or other devices that could interfere with aircraft radio altimeters.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39—AIRWORTHINESS DIRECTIVES

■ 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

■ 2. The FAA amends § 39.13 by adding the following new airworthiness directive:

2021–23–12 Transport and Commuter Category Airplanes: Amendment 39–21810; Docket No. FAA–2021–0953; Project Identifier AD–2021–01169–T.

(a) Effective Date

This airworthiness directive (AD) is effective December 9, 2021.

(b) Affected ADs

None.

(c) Applicability

This AD applies to all transport and commuter category airplanes equipped with a radio (also known as radar) altimeter. These radio altimeters are installed on various transport and commuter category airplanes including, but not limited to, the airplanes for which the design approval holder is identified in paragraphs (c)(1) through (19) of this AD.

(1) The Boeing Company
(2) Airbus SAS
(3) Bombardier Inc.
(4) Embraer S.A.
(5) Gulfstream Aerospace Corporation
(6) Gulfstream Aerospace LP
(7) Textron Aviation Inc.
(8) Pilatus Aircraft Limited
(9) Fokker Services B.V.
(10) Saab AB, Support and Services
(11) DeHavilland Aircraft of Canada Limited
(12) Airbus Canada Limited Partnership
(13) ATR–GIE Avions de Transport Régional
(14) Yaborã Indústria Aeronáutica S.A.
(15) MHI RJ Aviation ULC
(16) BAE Systems (Operations) Limited
(17) Lockheed Martin Corporation/Lockheed Martin Aeronautics Company
(18) Viking Air Limited
(19) Dassault Aviation

(d) Subject

Air Transport Association (ATA) of America Code 31, Indicating/Recording System; 34, Navigation.

(e) Unsafe Condition

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7–3.98 GHz frequency band (5G C-Band). The FAA is issuing this AD because radio altimeter anomalies that are undetected by the automation or pilot, particularly close to the ground (*e.g.,* landing flare), could lead to loss of continued safe flight and landing.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Airplane/Aircraft Flight Manual (AFM) Revision

On or before January 4, 2022: Revise the Limitations Section of the existing AFM by incorporating the limitations specified in figure 1 to paragraph (g) of this AD. This may be done by inserting a copy of this AD into the existing AFM.

Figure 1 to paragraph (g) – *AFM Revision*

(Required by AD 2021-23-12)

Radio Altimeter Flight Restrictions

When operating in U.S. airspace, the following operations requiring radio altimeter are prohibited in the presence of 5G C-Band wireless broadband interference as identified by NOTAM (NOTAMs will be issued to state the specific airports where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference):

- Instrument Landing System (ILS) Instrument Approach Procedures (IAP) SA CAT I, SA CAT II, CAT II, and CAT III
- Required Navigation Performance (RNP) Procedures with Authorization Required (AR), RNP AR IAP
- Automatic Landing operations
- Manual Flight Control Guidance System operations to landing/head-up display (HUD) to touchdown operation
- Use of Enhanced Flight Vision System (EFVS) to touchdown under 14 CFR 91.176(a)

(h) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Operational Safety Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the Operational Safety Branch, send it to the attention of the person identified in paragraph (i) of this AD. Information may be emailed to: *AMOC@faa.gov.*

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(i) Related Information

For more information about this AD, contact Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712–4137; phone: 817–222–5390; email: *operationalsafety@faa.gov.*

(j) Material Incorporated by Reference

None.

Issued on December 7, 2021.

Gaetano A. Sciortino,

Deputy Director for Strategic Initiatives, Compliance & Airworthiness Division, Aircraft Certification Service.

[FR Doc. 2021–26777 Filed 12–7–21; 2:00 pm]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2021–0879; Project Identifier MCAI–2020–01494–E; Amendment 39–21773; AD 2021–21–13]

RIN 2120–AA64

Airworthiness Directives; Rolls-Royce Deutschland Ltd & Co KG (Type Certificate Previously Held by Rolls-Royce plc) Turbofan Engines

Republication

Editorial Note: Rule document 2021–25005 was originally published on pages 64066 through 64068 in the issue of Wednesday,